

**AMENDMENTS TO THE SPECIFICATION**

Following the title, please insert the following paragraphs:

**Cross Reference to Prior Application**

This is a U.S. National Phase Application under 35 U.S.C. §371 of International Patent Application No. PCT/JP2004/004469, filed March 29, 2004, and claims benefit of Japanese Patent Application No. 2003/96664, filed March 31, 2003 both of which are incorporated by reference herein. The International Application was published in Japanese on November 11, 2004 as WO 2004/097867 A3 under PCT Article 21(2).

**Page 2, replace the following paragraph:**

In order to solve the above problems, a battery that uses a carbon material such as graphite and the like for the negative electrode and uses a lithium-contained metal oxide such as LiCoO<sub>2</sub> and the like for the positive electrode has been proposed. The battery is called a rocking-chair battery, in which lithium ~~is ions are~~ supplied to the negative electrode from the lithium-contained metal oxide of the positive electrode by charging after the assembly of the battery, and lithium in the negative electrode returns to the positive electrode by discharging. The battery does not use metal lithium ions in the negative electrode, and only lithium ions take part in charging and discharging. Therefore, the battery is called a lithium ion secondary battery, and distinguished from a lithium battery using metal lithium. The battery is characterized by high voltage and high capacity.

**Page 4 - 5, replace the following paragraphs:**

As a storage device suitable for uses demanding high energy density and high output characteristic, in which lithium ions move, Japanese Patent Application No. 10-531811 proposes an organic electrolyte battery, in which both positive and negative current collectors have holes penetrating front and rear surfaces respectively, a negative electrode active material can carry

lithium ions reversibly, and lithium ions from negative electrodes are carried by electrochemical contact with lithium metal arranged to face the negative or positive electrode.

In the above invention, since the holes penetrating the front and rear surfaces are provided at the current collectors, so that lithium ions can pass through between the front and rear surfaces of the electrodes without being blocked by the current collectors, lithium ions can be carried electrochemically not only to the negative electrodes arranged in the vicinity of the lithium metal but also to the negative electrodes arranged away from the lithium metal through the through-holes, even in the laminated cell structure of a storage device, in which many electrodes are laminated. In addition, since lithium ions can move freely between electrodes through the through-holes, the organic electrolyte battery can be charged and discharged smoothly.

In the above method, the current collectors are formed by coating a mixture of a binder resin and an electrode active material that can carry lithium ions reversibly. However, a current collector having holes that penetrate the front and rear surfaces, for example, such as an expanded metal, has lower tensile strength than a metal foil having with the same thickness but no holes, therefore a thick collector is required in an actual coating with an electrode active material, and thus it is difficult to improve the energy and power density by making the electrode thin. Also, when the current collector electrode is coated with the electrode active material, the electrode material passes through the through-holes, thereby being difficult to uniformly coat the current collectors. Furthermore, the electrodes materials applied at the through-holes or edge portions (end portion) of the current collector are likely to drop out, and it is difficult to manufacture a uniform electrode, whereby a short circuit can be induced in the battery, and the reliability and durability of the storage device can deteriorate.

Page 7, replace the following paragraph:

wherein the positive and negative electrode have the positive or negative electrode active material layer on a current substrate that has a conductive layer made of a conductive material on an

electrode collector, which has a through-hole that penetrates the front and rear surfaces, and the negative electrode electrochemically carries lithium ions.

Page 16, replace the following paragraph:

An organic electrolyte capacitor according to an aspect of the present invention is an organic electrolyte capacitor including positive electrodes, negative electrodes and an electrolyte capable of transferring lithium ions, in which the positive electrodes contain a substance as a positive electrode active material capable of carrying lithium ions and/or anions reversibly, the negative electrodes contain a substance as a negative electrode active material capable of carrying lithium ions reversibly, and the positive and negative electrodes have the positive and negative electrode active material layers provided on an electrode substrate that has a conductive layer made of a conductive material on current collectors, which have through-holes that penetrate the front and rear surfaces. Also, the organic electrolyte capacitor is characterized in that the negative electrode carries lithium ions electrochemically.

Page 17-18, replace the following paragraph:

The organic electrolyte capacitor shown in FIG. 1 has a structure in which a three-electrode-laminated unit having laminated positive electrodes, negative electrodes, a lithium electrode 7 and separators 3, is provided in laminated films 4 and 5, an electrolytic solution capable of transferring lithium ions is injected, and then two laminated films 4 and 5 are sealed by thermal-bonding and the like. In the aspect of the invention, the electrodes (positive and negative electrodes) have conductive layers (positive conductive layer 1b, negative conductive layer 2b) that are made of conductive materials on electrode current collectors (positive electrode current collector 1a, negative electrode current collector 2a) having holes that penetrate front and rear surfaces (the conductive layers are not shown in FIG. 1), and electrode active material layers (positive electrode active material layer 1, negative electrode active material 2) on the conductive layers. 'The positive electrode' is an electrode, from which electric current flows during discharging, and into which electric current flows during charging, and 'the negative electrode' is an electrode, into which

electric current flows during discharging, and from which electric current flows during chargingdischarging.

Page 22, replace the following paragraph:

Although the lithium electrode 7 is disposed on the electrode-laminated unit 6 so as to form the three-electrode-laminated unit 8, the position, the number and the shape of the lithium electrode 7 are not limited. However, it is preferable to dispose the lithium electrode 7 to face the positive or negative electrode to carry lithium ions smoothly in the above structure. For example, the lithium electrode 7 can be stuck directly to the negative electrode. When the lithium electrode 7 is stuck directly to the negative electrode, lithium is ions are carried to an adjacent negative electrode active material layer 2 directly. However, lithium ions should pass through at least one layer of the current collector to be carried to the rest of negative electrode active material layers 2 other than the adjacent negative electrode active material layer 2.

Page 22 - 23, replace the following paragraph:

As the lithium electrode 7 discharges lithium ions, the amount of the lithium electrode 7 decreases gradually. For this reason, it is preferable that conductive and porous members such as a stainless steel mesh and the like be used as the lithium electrode current collector 7a, and porous portions of the lithium electrode current collector be blocked with at least a part of the lithium electrode 7. Then the number of openings induced by the loss of the lithium electrode between electrodes decreases even when lithium is ions are carried to the electrode from the lithium electrode 7, whereby lithium is ions are carried to the electrode active material smoothly.

Page 24 - 25, replace the following paragraph:

The laminated films 4 and 5 are sealed with the positive terminal 1c and the negative terminal 2c interposed therebetween. The positive terminal 1c and the negative terminal 2c are thermally bonded to the laminated films 4 and 5 at the thermal bonding portions A and B that are shown in FIG. 2. That is, the organic electrolyte capacitor is sealed at the thermal bonding portions

A and B between the laminated films 4 and 5 and the respective terminals and the thermal bonding portion C between the laminated films 4 and 5 in an example of FIG. 2. Therefore, the positive terminal 1c and the negative terminal 2c project from between the laminated films 4 and 5 to the outside of the battery capacitor, and the positive electrode active material layer 1 can be connected with an external electric circuit through the positive terminal 1c, and the negative electrode active material layer 2 and the lithium electrode 7 can be connected with the external electric circuit through the negative terminal 2c.

Page 31, replace the following paragraphs:

When the porosity of the current collector is high, lithium ions can be uniformly carried to the negative electrode in a short time. However, the strength of the current collector decreases, and wrinkles can be easily induced in the current collector or the current collector can breakdown easily. In addition, it becomes difficult to hold conductive materials in the through-holes, therefore the manufacturing yield of the electrode decreases due to the dropout of the conductive materials, the breakdown of the electrode and the like.

On the other hand, when the porosity of the current collector is low, there are problems in that it takes a long time to carry lithium ions to the negative electrode, whereby the manufacturing efficiency decreases and enhanced scatter in cell characteristics is expected . However, the strength of the collector increases, and the active materials do not fall off easily, therefore the manufacturing yield of the electrode increases. It is desirable to decide the porosity or pore diameter of the current collector properly within the above-mentioned range in consideration of the structure (laminated type, roll type and the like) or productivity of the battery capacitor.

Page 41, replace the following paragraphs:

In the organic electrolyte capacitor according to the aspect of the invention, the negative electrode contains the negative electrode active material that can carry lithium ions reversibly. In the aspect of the invention, the negative electrode active material layer 2 is formed by adding the

conducting agent, the binder resin and the like to the negative electrode active material according to need.

Any substance capable of carrying lithium ions reversibly can be used as the negative electrode active material of the invention. For example, various carbon materials that are obtained from graphite, natural or synthetic, cokes, pitch, thermosetting resin, palm husk, tree and the like can be used, carbon fiber, polyacene-based substance, tin oxide, silicon oxide and the like.

Page 43, replace the following paragraph:

The insoluble and infusible base substance used; in the aspect of the invention shows X-ray diffraction (CuK $\alpha$ ) main peak of 2 $\theta$ , below 24°, and another broad peak in the range of 41 to 46°. That is, the X-ray diffraction result illustrates that the insoluble and infusible base substance has a polyacene-based skeletal structure, in which aromatic polycyclic structure is developed properly, and an amorphous structure, whereby lithium ions can be stably doped. Therefore, the insoluble and infusible base substance is useful for an active material of the organic electrolyte capacitor according to the aspect of the invention.

Page 47 - 48, replace the following paragraph:

When an activated carbon is manufactured by a conventional method, a large number of micropores having the diameters of which are ~~below 0.7 nm~~ in the range of 0.7 to 2.0 nm, and sub micropores having the diameters of which are below 0.7 nm, are developed, and only small number of mesopores having the diameters in the range of 2.0 to 50 nm, are formed in the activated carbon, whereby the volume ratio of the mesopores is below 10%. Therefore, a common activated carbon has superior absorption ability for molecules having smaller sizes than 2.0 nm, however, it is not suitable to make faster the moving speed of the electrolyte of the organic electrolyte capacitor, organic or inorganic compound, and assembly of inorganic or organic compound, which is composed of solvated organic or inorganic compound, and has larger sizes than that of organic or inorganic compound.

Page 51 - 52, replace the following paragraphs:

In the organic electrolyte capacitor according to the aspect of the invention, a lithium electrode 7 is disposed in the organic electrolyte capacitor previously as lithium ions supply source. The lithium electrode 'such as lithium metal or lithium-aluminum alloy' should contain lithium, and be capable of supplying lithium.

Amount of the lithium metal (lithium ions contained in the lithium electrode) disposed in the organic electrolyte capacitor should be enough to make the negative electrode obtain a predetermined capacitance. However, when the amount of the lithium has a larger amount of lithium ion than is required, the lithium electrode may remain in the organic electrolyte capacitor after a required amount of lithium ion is carried from the lithium electrode 7 (the definition of the capacitance will be described below). However, it is preferable that a required amount of lithium be disposed in the organic electrolyte capacitor, and all amount of lithium ion be carried to the negative electrode in order to guarantee the safety.

Page 52 - 53, replace the following paragraphs:

When a conductive porous body such as stainless steel mesh and the like is used as the lithium electrode current collector, it is preferable that at least part of the lithium electrode be embedded into the porous portions of the lithium electrode current collector. It is more preferable that over 80% of the lithium electrode be filled into the porous portions of the conductive porous body. Then gaps that are induced between the electrodes by the loss of the lithium electrode decrease even when lithium is ions are carried to the negative electrode, and thus the reliability of the organic electrolyte capacitor can be reliably improved.

It is preferable that the lithium electrode current collector having the lithium electrode thereon be disposed so as to face the positive or negative electrode. With the above arrangement, lithium ions can be carried smoothly to the negative electrode. It is possible to dispose the lithium electrode current collector having the lithium electrode thereon in the cross-sectional direction of the electrode-laminated unit, and to carry lithium ions to the negative electrode active material by short-

circuiting the negative terminal from the lithium electrode terminal. However, if the negative electrode is wide in this case, lithium ions cannot be carried uniformly to the electrode. Therefore, the position of lithium electrode must be determined properly in consideration of the structure of the cell, the size of the electrode and the like.

Page 58 - 59, replace the following paragraph:

Meanwhile, it is preferable to use an active material capable of carrying lithium ions and/or anions reversibly for the positive electrode in the organic electrolyte capacitor according to the aspect of the invention. The above active material includes activated carbon, which is used for the positive and negative electrodes of the conventional electric double-layer capacitor. In addition, it is preferable to use an active material capable of carrying lithium ions reversibly to the negative electrode, to make the capacitance per unit weight of the negative electrode active material over three times larger than that of the positive electrode active material by controlling the carrying amount of lithium ion to the negative electrode active material, and to make the weight of the positive electrode active material larger than that of the negative electrode active material.

Page 60, replace the following paragraph:

In addition, the capacity of the cell is the product of the difference between the voltages when the discharging of the cell begins and is finished, that is, the variation of voltage ‘the capacitance of the cell. Although the unit of the capacity is C (coulomb)’ since 1 C is the amount of electric charges when 1 A of electric current flows for one second, C is converted into mAh in the description invention. The capacity of the positive electrode represents the product of the difference of the electrode potentials of the positive electrode when discharging begins and is finished (the variation of electrode potential of the positive electrode) and the capacitance of the positive electrode, and a unit thereof is C or mAh. Similarly, the capacity of the negative electrode represents the product of the difference of the electrode potentials of the negative electrode when discharging begins and is finished (the variation of electrode potential of the negative electrode)

multiplied by the capacitance of the negative electrode, and a unit thereof is C or mAh. The capacities of the cell, positive and negative electrodes have the same values.

Page 61 - 62, replace the following paragraphs:

In the organic electrolyte capacitor according to the aspect of the invention, the electrode potential of the negative electrode is lower than 3 V compared with that of the positive electrode at about 3 V when a given amount of lithium ions is carried to the negative electrode previously in order to obtain the capacity required for the capacity of the negative electrode.

How high the charging voltage of the capacitor is made is generally determined by the electrode potential of the positive electrode. That is, the electrolytic solution is decomposed by oxidation at a high electrode potential of the positive electrode, whereby that becomes the demarcation potential. Comparing with a capacitor having a conventional cell structure, the electrode potential of the negative electrode can be lowered than that of the negative electrode in the capacitor according to the aspect of the invention, which carries lithium ions previously, whereby the larger electrode potential difference between the positive and negative electrodes can be obtained. Therefore, it is possible to have a withstand voltage of over 3 V and about 3.6 to 4.1 V with the structure of the aspect of the invention, and thus the energy density can be improved comparing with a conventional electrode double-layer capacitor having the withstand voltage of about 2.3 to 2.7 V.

In addition, it is possible to increase the capacity of the positive electrode by a lower electrode potential of the negative electrode. That is, it is possible to increase the variation of the electrode potential of the positive electrode is discharged, since the electric potential of the negative electrode is lower than 3V at the end of the discharging. Specifically, it is possible to have an electrode potential of the positive electrode below 3 V, for example, to lower the electrode potential down to 2 V, at the end of the discharging (In this case, the positive electrode potential decreases due to the release of anions down to 3 V and the doping of the lithium ions below 3 V).

Page 64 -65, replace the following paragraph:

In FIG. 1, each of the positive electrode current collectors 1a has an extended portion, which becomes a terminal connecting portion A', and is welded to a positive terminal 1b at the terminal connecting portion A'. In addition, each of the negative electrode current collectors 2a and the lithium electrode current collector 7a have extended portions, which become terminal connecting portions B', and are welded to a negative terminal 2b at the terminal connecting portions B'. The shape of the extended portion, which becomes the terminal connecting portion, is not limited. It is convenient and preferable that several extended portions of the positive electrode current collectors (or the negative current electrode collectors) be tied with each other and welded by ultrasonic welding and the like. Although the positive terminal 1b is disposed at the opposite side of the negative terminal 2b in the first embodiment, there is no limitation on the positions of the terminals, for example, the positive terminal 1b may be disposed at the same side of the negative terminal 2b. When the laminated films have the same size, it is preferable that the positive and negative terminals 1b and 2b, and the lithium electrode terminal 7b be disposed at the same side, since the sizes of the electrodes can be increased and thus the capacity can be increased.

Page 72, replace the following paragraph:

When an electrolytic solution is injected, every negative electrode is in electrochemical contact with the lithium electrodes, and lithium ions in the electrolytic solution eluted from the lithium electrode move to the negative electrode to be carried to the negative electrode as time goes by. When the lithium is ions are carried to the negative electrode, the negative electrode is distorted due to skewness occurred by the intrusion of the lithium ions to the negative electrode. Thus, it is preferable to fix the negative electrodes with external force to maintain the shape of the negative electrodes.

Page 75, replace the following paragraph:

The negative electrode is charged with 400 mAh/g of lithium ions per unit weight of the negative electrode active material at a charging current of 1 mA, and then is discharged at 1 mA

until the voltage becomes 1.5 V. The capacitance per unit weight of the negative electrode is 652 F/g, which is estimated from the discharging time, that is, the time required for the electrode potential to change as much as 0.2 V from the negative electrode at one minute later from the beginning of the discharging.

Page 77 - 78, replace the following paragraph:

Both surfaces of a 35 µm-thick (porosity of 50%) aluminum expanded metal (manufactured by Nippon Metal Industry Co., Ltd.) are coated with a non-aqueous carbon-based conductive paint (manufactured by Acheson (Japan) Limited: EB-815) by the spray method, and then dried so as to obtain an electrode substrate for the positive electrode having conductive layers. The total thickness (the sum of the thickness of the positive electrode current collector and that of the conductive layer) is 45 µm, and almost all through-holes are blocked with the conductive materials. The above slurry for the positive electrode is coated on both surfaces of the electrode substrate for the positive electrode by the die method. The thickness of the positive electrode active material layer is 142.5 µm on a single surface. The electrode is then pressed. Then positive negative electrode 1, the total thickness (the sum of the thickness of the positive electrode active material layers on both surfaces, those of the conductive layers on both surfaces, and that of the positive electrode current collector) of which is 330 µm, is obtained.

Page 78 - 79, replace the following paragraph:

Each of the 150 µm-thick negative electrode 1, 157 µm-thick negative electrode 2, and 163 µm-thick negative electrode 3, and 330 µm-thick positive electrode 1 are cut into  $5.0 \times 7.0 \text{ cm}^2$ -size electrodes having the shapes of FIG. 48 16, and 25 µm-thick cellulose/rayon mixed non-woven fabric layers are used as the separators. Welding portions between the positive electrode current collector and the connecting terminal (hereinafter referred to as 'connecting terminal welding portion') is disposed at the opposite side of the connecting terminal welding portion of the negative electrode current collector as shown in FIG. 48 16, and the electrodes and separators are laminated

The thickness of the cell is 10 mm, and the numbers of layers for the positive and negative electrodes are seventeen.

Page 80, replace the following paragraph:

After 14-day exposure to the room temperature, one of the two cells is disassembled. The result is that lithium ~~is ions are~~ preliminarily charged in order to obtain the capacitance per unit weight of the negative electrode active material of over 650 F/g from the fact that the lithium metal is completely removed. The ratio of the capacitance per unit weight of the negative electrode active material to that of the positive electrode active material is 7.41.

Page 83, replace the following paragraph:

After 14-day exposure to the room temperature, one of two cells for each type capacitor each cell is disassembled. It is turned out that lithium ~~is ions are~~ preliminarily charged in order to obtain the capacitance per unit weight of the negative electrode active material of over 650 F/g from the fact that the lithium metal is completely removed. The ratio of the capacitance per unit weight of the negative electrode active material to that of the positive electrode active material is 7.41.

Page 84, replace the following paragraph:

After 14-day exposure to the room temperature, one of the cells for each capacitor each cell is disassembled. The result ~~is ions are~~ that lithium is preliminarily charged in order to obtain the capacitance per unit weight of the negative electrode active material of over 650 F/g from the fact that the lithium metal is completely removed. The ratio of the capacitance per unit weight of the negative electrode active material to that of the positive electrode active material is 7.41.

Page 86 - 87, replace the following paragraph:

Two cells of film-type capacitors are assembled in the same manner as that of the first example except that 135  $\mu\text{m}$ -thick negative electrode 5 and 330  $\mu\text{m}$ -thick positive electrode 1 used

in the first example are used. The number of each of the positive and negative electrodes is eighteen when the thickness of the cell is 10 mm $\mu$ m. Since the number of each of the positive and negative electrodes is eighteen, lithium metal foils (205  $\mu$ m, 5.0  $\times$  7.0 cm<sup>2</sup>) pressed on an 80  $\mu$ m-thick stainless steel nets are used as the lithium metal, and disposed at the upper and lower surfaces of the electrode-laminated unit to face the negative electrodes.

Page 87 - 88, replace the following paragraph:

After 14-day exposure to the room temperature, one of the two cells is disassembled. The result is that lithium ~~is ions~~ are preliminarily charged in order to obtain the capacitance per unit weight of the negative electrode active material of over 650 F/g from the fact that the lithium metal is completely removed. The ratio of the capacitance per unit weight of the negative electrode active material to that of the positive electrode active material is 7.41.

Page 90 - 91, replace the following paragraphs:

The negative electrode is charged to 500 mAh/g of lithium ions per unit weight of the negative electrode active material at a charging current of 1 mA, and then discharged at 1 mA until the voltage becomes 1.5 V. The capacitance per unit weight of the negative electrode is 9865 F/g, which is estimated from the discharging time, that is, the time required for the electrode potential to change as much as 0.2 V from the negative electrode one minute later from the beginning of the discharging.

Both surfaces of a 35  $\mu$ m-thick (porosity of 50%) copper expanded metal (manufactured by Nippon Metal Industry Co., Ltd.) are coated with non-aqueous carbon-based conductive paint (manufactured by Acheson (Japan) Limited: EB-815) by the spray method, and then dried so as to obtain an electrode substrate for the negative positive electrode having conductive layers. The hard carbon slurry for the negative electrode is coated on both surfaces of the electrode substrate for the negative electrode by the die method to obtain a negative electrode active material layer, the

thickness of which is 57.5  $\mu\text{m}$  on a single surface. After drying and pressing, the negative electrode 6, the total thickness of which is 160  $\mu\text{m}$ , is obtained.

Two cells of film-type capacitors are assembled in the same manner as that of the first example except that 160  $\mu\text{m}$ -thick negative electrode 6 and 330  $\mu\text{m}$ -thick positive electrode 1 used in the first example are used. The number of each of the positive and negative electrodes is seventeen when the thickness of the cell is 10 mm $\mu\text{m}$ . Since seventeen electrodes are laminated, lithium metal foils (215  $\mu\text{m}$ ,  $5.0 \times 7.0 \text{ cm}^2$ ) pressed to 80  $\mu\text{m}$ -thick stainless steel nets are used as the lithium metal, and disposed at the upper and lower surfaces of the electrode-laminated unit to face the negative electrodes. In addition, the weight of the positive electrode active material layer is 1.65 times larger than that of the negative positive electrode active material layer.

Page 92, replace the following paragraph:

After 14-day exposure to the room temperature, one of the two cells is disassembled. The result is ions are that lithium is preliminarily charged in order to obtain the capacitance per unit weight of the negative electrode active material of over 9850 F/g from the fact that the lithium metal is completely removed. The ratio of the capacitance per unit weight of the negative electrode active material to that of the positive electrode active material is 109.7.

Page 95, replace the following paragraph:

Two cells of film-type capacitors are assembled in the same manner as that of the first example except that 330  $\mu\text{m}$ -thick positive electrode 6 and 157  $\mu\text{m}$ -thick negative electrode 2 used in the first example are used. The number of each of the positive and negative electrodes is seventeen when the thickness of the cell is 10 mm $\mu\text{m}$ . Since seventeen electrodes are laminated, lithium metal foils (195  $\mu\text{m}$ ,  $5.0 \times 7.0 \text{ cm}^2$ ) pressed onto 80  $\mu\text{m}$ -thick stainless steel nets are used as the lithium metal, and disposed at the upper and lower surfaces of the electrode-laminated unit to face the negative electrodes.

Page 96, replace the following paragraph:

After 14-day exposure to the room temperature, one of the two cells is disassembled. The result is that lithium ~~is ions are~~ preliminarily charged in order to obtain the capacitance per unit weight of the negative electrode active material of over 650 F/g from the fact that the lithium metal is completely removed. The ratio of the capacitance per unit weight of the negative electrode active material to that of the positive electrode active material is 4.94.

Page 98, replace the following paragraph:

The negative electrode is charged with 400 mAh of lithium ~~ions~~ per unit weight of the negative electrode active material at a charging current of 1 mA, and then discharged at 1 mA until the voltage becomes 1.5 V. The capacitance per unit weight of the negative electrode is 650 F/g, which is estimated from the discharging time, that is, the time required for the electrode potential to change as much as 0.2 V from the negative electrode one minute later from the beginning of the discharging.

Page 99, replace the following paragraph:

Both surfaces of a 35  $\mu\text{m}$ -thick (porosity of 50%) copper expanded metal (manufactured by Nippon Metal Industry Co., Ltd.) are coated with an aqueous carbon-based conductive paint (manufactured by Nippon Graphite Industries, Ltd.: Varniphite T702A) by the spray method, and then dried so as to obtain an electrode substrate for the ~~negative positive~~-electrode having conductive layers. The total thickness of the electrode substrate is 45  $\mu\text{m}$ , and almost all through-holes are blocked with conductive materials, whereby the blocking ratio is 98%. The slurry for the negative electrode is coated on both surfaces of the electrode substrate for the negative electrode, and then pressed so as to obtain a total 160  $\mu\text{m}$ -thick negative electrode 7.

Page 100 - 101, replace the following paragraphs:

Two cells of film-type capacitors are assembled in the same manner as that of the first example except that 330  $\mu\text{m}$ -thick positive electrode 7 and 160  $\mu\text{m}$ -thick negative electrode 7 are used. The number of each of the positive and negative electrodes is seventeen when the thickness of the cell is 10  $\text{mm}\mu\text{m}$ . Since seventeen electrodes are laminated, lithium metal foils (175  $\mu\text{m}$ ,  $5.0 \times 7.0 \text{ cm}^2$ ) pressed onto an 80  $\mu\text{m}$ -thick stainless steel nets are used as the lithium metal, and disposed at the upper and lower surfaces of the electrode-laminated unit to face the negative electrodes. In addition, the weight of the positive electrode active material is 1.96 times larger than that of the negative electrode active material.

After 14-day exposure to the room temperature, one of the two cells is disassembled. The result is that lithium ~~is ions are~~ preliminarily charged in order to obtain the capacitance per unit weight of the negative electrode active material of over 650 F/g from the fact that the lithium metal is completely removed. The ratio of the capacitance per unit weight of the negative electrode active material to that of the positive electrode active material is 7.83.

Page 105- 106, replace the following paragraphs:

Two cells of film-type capacitors are assembled in the same manner as that of the first example except that 330  $\mu\text{m}$ -thick positive electrode 8 and 157  $\mu\text{m}$ -thick negative electrode 2 used in the first example are used. The number of each of the positive and negative electrodes is seventeen when the thickness of the cell is 10  $\text{mm}\mu\text{m}$ . Since seventeen electrodes are laminated, lithium metal foils (195  $\mu\text{m}$ ,  $5.0 \times 7.0 \text{ cm}^2$ ) pressed onto 80  $\mu\text{m}$ -thick stainless steel nets are used as the lithium metal, and disposed at the upper and lower surfaces of the electrode-laminated unit to face the negative electrodes. In addition, the weight of the positive electrode active material is 1.65 times larger than that of the ~~negative positive~~ electrode active material.

After 14-day exposure to the room temperature, each one of the two cells is disassembled. The result is that lithium ~~is ions are~~ preliminarily charged in order to obtain the capacitance per unit weight of the negative electrode active material of over 650 F/g from the fact

that the lithium metal is completely removed. The ratio of the capacitance per unit weight of the negative electrode active material to that of the positive electrode active material is 7.16.

Page 108, replace the following paragraph:

Two cells of film-type capacitors are assembled for each of the positive electrodes 9 to 11 in the same manner as that of the first example except that 157  $\mu\text{m}$ -thick negative electrode 2 of the first example and 225, 330 and 385  $\mu\text{m}$ -thick positive electrode 9, 10 and 11 are used. The number of the electrodes is twenty-one for positive electrode 9, seventeen for positive electrode 10, and fifteen for positive electrode 11 when the thickness of the cell is 10 ~~mm $\mu\text{m}$~~ . In addition, the weight of the positive electrode active material is 1.04 times larger than that of the negative electrode active material in the cell using positive electrode 9, 1.65 times larger in the cell using positive electrode 10, and 1.97 times larger in the cell using positive electrode 11. Lithium metal foils (240  $\mu\text{m}$ , 5.0  $\times$  7.0  $\text{cm}^2$ ), lithium metal foils (195  $\mu\text{m}$ , 5.0  $\times$  7.0  $\text{cm}^2$ ) and lithium metal foils (170  $\mu\text{m}$ , 5.0  $\times$  7.0  $\text{cm}^2$ ) pressed onto 80  $\mu\text{m}$ -thick stainless steel nets respectively are used as the lithium metal for the cells using positive electrode 9, 10 and 11, and disposed at the upper and lower surfaces of the electrode-laminated unit to face the negative electrodes.

Page 109, replace the following paragraph:

After 14-day exposure to the room temperature, one of the two cells is disassembled. It is turned out that lithium ~~is ions are~~ preliminarily charged in order to obtain the capacitance per unit weight of the negative electrode active material of over 650 F/g from the fact that the lithium metal is completely removed. The ratio of the capacitance per unit weight of the negative electrode active material to that of the positive electrode active material is 7.41.

Page 112 - 113, replace the following paragraphs:

Two cells of film-type capacitors are assembled for each of the positive electrodes 12 to 15 in the same manner as that of the first example except that 330  $\mu\text{m}$ -thick activated carbon positive

electrodes 12 to 15 and 150  $\mu\text{m}$ -thick negative electrode 1 used in the first example are used. The number of each of the positive and negative electrodes is seventeen when the thickness of the cell is 10  $\text{mm}\mu\text{m}$ . In addition, since seventeen electrodes are laminated, lithium metal foils (195  $\mu\text{m}$ ,  $5.0 \times 7.0 \text{ cm}^2$ ) pressed onto 80  $\mu\text{m}$ -thick stainless steel nets are used as the lithium metal in all cases, and disposed at the upper and lower surfaces of the electrode-laminated unit to face the negative electrodes.

After 14-day exposure to the room temperature, one of the two cells is disassembled. The result is that lithium ~~is ions are~~ preliminarily charged in order to obtain the capacitance per unit weight of the negative electrode active material of over 650 F/g from the fact that the lithium metal is completely removed. The ratio of the capacitance per unit weight of the negative electrode active material to that of the positive electrode active material is 7.41.

Page 116, replace the following paragraph:

Two cells of film-type capacitors are assembled for each the of negative electrodes 8 to 12 in the same manner as that of the first example except that 225  $\mu\text{m}$ -thick positive electrode 9 of the eighth example and 85, 105, 145, 195 and 275  $\mu\text{m}$ -thick negative electrodes 8, 9, 10, 11 and 12 are used. The number of each of the positive and negative electrodes is twenty six for the cell using negative electrode 8, twenty four for the cell using negative electrode 9, twenty one for the cell using negative electrode 10, nineteen for the cell using negative electrode 11, and sixteen for the cell using negative electrode 12, when the thickness of the cell is 10  $\text{mm}\mu\text{m}$ .

Page 117, replace the following paragraph:

After 14-day exposure to the room temperature, one of the two each cells is disassembled. The result is that lithium ~~is ions are~~ preliminarily charged in order to obtain the capacitance per unit weight of the negative electrode active material of over 650 F/g from the fact that the lithium metal is completely removed. The ratio of the capacitance per unit weight of the negative electrode active material to that of the positive electrode active material is 7.41.

Page 119 - 120, replace the following paragraphs:

The number of each of the positive and negative electrodes is seventeen when the thickness of the cell is 10 mm $\mu$ m. In addition, since seventeen electrodes are laminated, lithium metal foils (195  $\mu$ m, 5.0  $\times$  7.0 cm<sup>2</sup>) pressed onto 80  $\mu$ m-thick stainless steel nets are used as the lithium metal, and disposed at the upper and lower surfaces of the electrode-laminated unit to face the negative electrodes.

After 14-day exposure to the room temperature, one of the two cells is disassembled. The result is that lithium ~~is ions are~~ preliminarily charged in order to obtain the capacitance per unit weight of the negative electrode active material of over 650 F/g from the fact that the lithium metal is completely removed. The ratio of the capacitance per unit weight of the negative electrode active material to that of the positive electrode active material is 4.94.

Page 121 - 122, replace the following paragraphs:

A non-aqueous conductive paint (binder: polyamide-imide) is printed by gravure printing and dried on a surface (front surface) of a 30  $\mu$ m-thick aluminum foil (manufactured by Nippon Foil MFG Co., Ltd.) so as to form a 5  $\mu$ m-thick conductive layer. In addition, a non-aqueous conductive paint (binder: polyamide-imide) is printed by gravure printing and dried on the other surface (rear surface) of the aluminum foil so as to form a 5  $\mu$ m-thick conductive layer having many through-holes. The diameter of the through-hole is 0.4 mm $\phi$ , and the through-holes occupy 25% of the aluminum copper-foil.

Portions of the aluminum foil, which are exposed through the through-holes of the conductive layer on the rear surface, are dissolved by etching so as to obtain an electrode substrate for the positive negative-electrode having through-holes. In this case, the through-holes of the aluminum foil are blocked with the conductive layer on the front surface, and the blocking rate is 100%.

Page 124, replace the following paragraph:

After 14-day exposure to the room temperature, one of the two cells is disassembled. The result that lithium ~~is ions are~~ preliminarily charged in order to obtain the capacitance per unit weight of the negative electrode active material of over 650 F/g from the fact that the lithium metal is completely removed. The ratio of the capacitance per unit weight of the negative electrode active material to that of the positive electrode active material is 7.41.